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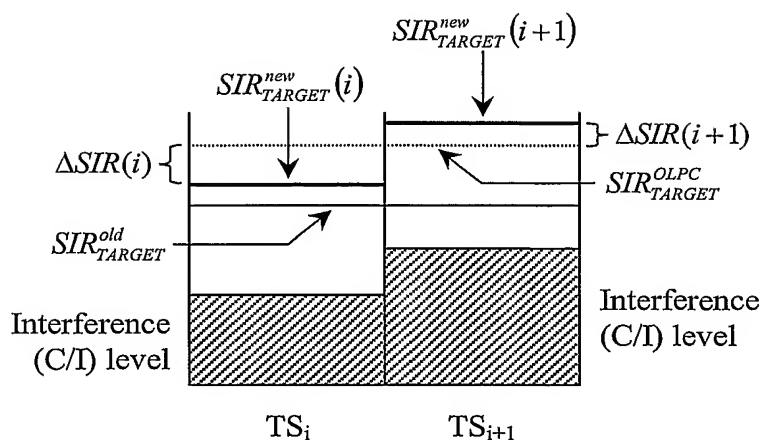
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(54) Title: METHOD, DEVICE AND SYSTEM WITH SIGNAL QUALITY TARGET FOR RADIO FREQUENCY POWER CONTROL IN CELLULAR SYSTEMS



(57) Abstract: Improved power control mechanism for cellular time division duplex systems supporting multislot services. The improved power control mechanism allows for individual adaptation transmission power control (TPC) commands to time slot specific interference conditions in case several time slots are assigned to one composite transmission channel (CTrCH).

METHOD, DEVICE AND SYSTEM WITH SIGNAL QUALITY TARGET
FOR RADIO FREQUENCY POWER CONTROL IN CELLULAR SYSTEMS

- 5 The present invention relates to a method for operating radio frequency power control and devices and system allowing for performing said method. In particular, the radio frequency power control relates to a fast power control for radio frequency transmission systems being based on time division duplex (TDD).
- 10 The evolution of analog cellular phone systems referred to as first generation systems to digital systems currently in use referred to as second generation systems represents one major step in technology to the information society. The economical success of the second generation systems is reflected by the wide spread of cellular terminals, which exceeds significantly the number of wired phone terminals in several industrial states, expressing the need of modern society for
- 15 permanent attainability and instantaneous information exchange. Second generation systems such as GSM (global system for mobile communications), PDC (personal digital cellular), cdmaOne (IS-95) and US-TDMA (IS-136) have been developed primarily for enabling wireless voice communications. During operation of those systems customers have increasingly found advantages in the use of other wireless services such as messaging services (e.g. short message
- 20 service) and data access services (e.g. i mode); but the second generation systems lack significantly in requirements and perquisites, which are essential for enhanced messaging and data access services.
- Third generation systems, which introduction now is imminent although the introduction thereof
- 25 was scheduled years before, are developed with design prerequisites addressing enhanced communications which require for instance high data transmission bandwidth, quality of service to enable for instance high quality image and video communications and fast data access services on private and public packet-switched networks, respectively. Although the third generation systems are introduced now detail developments and improvements are still under work, which
- 30 reflects the complexity of the third generation systems caused by the challenging design prerequisites. Although the development of the third generation systems has been brought together in an umbrella organization, the third generation partnership project (3GPP), the original target of the third generation process was a single common global air interface. This goal was not achieved. Whereas Europe and Asia including Japan and Korea have decided to adopt WCDMA
- 35 (wideband code division multiple access) air interface, North America embeds third generation

services into the existing second generation systems by adopting EDGE (enhanced data rates for GSM evolution) and multicarrier CDMA (cdma2000). The WCDMA standard covers UTRAN-FDD (UMTS terrestrial radio access network - frequency division duplex) systems and UTRAN-TDD (UMTS terrestrial radio access network - time division duplex) systems, the applicability of which primarily depends on the availability of corresponding frequency bands therefor. The China Telecommunication Standard group (CWTS) has pushed ahead its own third generation system referred to as TD-SCDMA (time division synchronous code division multiple access) by migrating the current GSM standard to a time division duplex system allowing symmetric and asymmetric downlink data communications with an adaptive CDMA component. The TD-SCDMA is approved by the International Telecommunications Union (ITU) and included in the WCDMA-UTRAN-TDD standard.

The radio resource efficiency is a main issue of third generation systems and particularly of WCDMA systems. The efficient use of radio resources relates different fields comprising especially individual data rates of mobile terminals subscribed within a cell of such a WCDMA system, total number of mobile terminals subscribed within the cell and total data rate within available within cell; only to enumerate a selection of related fields. For radio resource efficiency CDMA systems and correspondingly WCDMA systems implement power control mechanisms. The power control mechanisms are implemented to guarantee that a radio frequency signal emitted by a cellular transceiver of either a cellular terminal (UE) or a base station (BS) will be received with a suitable radio frequency power level determined as far as possible. The suitable radio frequency power level is among others determined by required data rates and data reliability in conjunction with environmental effects such as near-far problematic, path loss, fast Rayleigh fading etc.

In order to accomplish power control WCDMA standard purposes the implementation of outer loop and inner loop power control applicable for radio frequency signal power control of physical channels for both data transmission directions, i.e. downlink (from base station to cellular terminal) and uplink (from cellular terminal to base station) direction is envisaged.

The object of the present invention is to provide an improved power control mechanism applicable with power control of the WCDMA standard. More particularly, the object of the present invention is to provide an enhanced inner loop power control mechanism particularly applicable with time division duplex systems supporting multislot services.

The object of the present invention is attained by a mechanism, an apparatus and a system for adjusting radio frequency transmission power selectively for each time slot.